J Krishi Vigyan 2021, 10 (1) : 6-10 DOI : 10.5958/2349-4433.2021.00053.2

# Aluminium Unipole Ladder Can Replace Bamboo Pole Used in Harvesting of Black Pepper at Kollihills of Tamilnadu

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## ABSTRACT

Tribal Sub Plan Scheme is being implemented by ICAR-KVK, Namakkal at Elangiyampatti, Kollihills since 2020. Here pepper is cultivated in an area of 80 ha. by 242 farmers. As pepper vines grow up to 4 -5 m height, manual harvesting which is only available method in Kollihills that requires a ladder and a skilled labour. Normally, single bamboo pole is used as a support to climb the shade trees of black pepper for harvesting. It is a very time-consuming activity with lot of difficulties and it is harmful to the vine. In order to avoid such situation in black pepper harvesting, KVK, Namakkal has introduced and supplied Aluminium ladder to the tribal farmers on cost sharing basis under TSP. Comparing the field efficacy of both the ladders, totally 4 pepper vines of 15 yr old or 6 vines of less than 10 yr old were harvested in a day by using bamboo pole when compared to aluminium ladder (6 - 8 vines respectively). In aluminium pole method, farmer could harvest 500 kg of green berries/ day and spend only Rs.22500/0.4 ha alone for harvesting, besides saved up to Rs.13500/ 0.4 ha as against Rs.36000/0.4 ha in bamboo pole method.

**Key Words:** Black pepper, Harvesting , ladders – Kollihills.

## INTRODUCTION

Black pepper (*Piper nigrum*) is one of the important spice crops grown in Kollihills of Namakkal district in an area of 2340 ha with a productivity of 0.2 t / ha (Source: Department of Horticulture, Namakkal, 2020). It is an introduced crop to Kollihills during 1970's as an alternative to the traditional cereals and millets. It provides many useful products such as black pepper, white pepper, oil, and oleoresin. Now it is cultivated as a pure crop or intercropped with coffee or other crops including cardamom. Ninety-eight per cent of the pepper area is under the variety Panniyur-1, Panniyur 2 and the rest are with Kottanadan, Karimunda and Kurumilagu local. Most of pepper vines are 10 -15 yr old. In Elangiyampatti village, Gundurnadu Panchayat of Kollihills, Black pepper is cultivated in an area of 40 ha by 242 farmers. In this village the crop is harvested during the month of April - May. It is important to harvest pepper at the proper stage of maturity to achieve a dried product of good colour and appearance. Harvest starts when one or two berries turn yellow. The spikes are nipped of by hand and collected in bags in the young plantations. Since pepper vines grow on some host trees, it is necessary that for plucking one must climb on the trees. As, pepper vines grow up to 4 -5 m height, manual harvesting which is only available method in Kollihills that requires ladder and skilled labour (Singh and Devi, 2020). Normally, single pole bamboo ladder is used as a support to climb the shade trees (Silver oak – *Grevillea robusta*) of black pepper for harvesting. It is a very time-consuming activity with lot of difficulties and dangerous to the labourer and also harmful to the vine. The required skills include climbing up the ladder, avoiding ant bites, and conquering the fear of heights. Therefore, this operation of pepper harvesting is limited only for skilled labours. This process of plucking pepper involves high risk that there are chances of

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**Table 1. Comparison of Bamboo Pole Vs Aluminium Unipole Ladder.**

| Sr. No | Description | Bamboo pole | Aluminium unipole ladder |
|---|---|---|---|
| 1 | Target user | Skilled labour | Farmer and farm women |
| 2 | Target farmer | Pepper growers | |
| 3 | Material | Bamboo | Aluminium |
| 4 | Commercial value / pole | Rs.700 / pole | Rs.11500 / ladder |
| 5 | Durability | 2 -3 yr | 14 -15 yr |
| 6 | Safety | Unsafe | User friendly & highly safe |
| 7 | Weight | 30 - 35 kg | 20 kg |
| 8 | Operating mechanism | Used as a support to climb the trees | |
| 9 | Portability | Heavy weight | Very easy – light weight |
| 10 | Industry standard | Single use | Multipurpose |
| 11 | Technology | Indigenous | Modified based on the indigenous method. 30 ft length unipole ladder (20 ft + 10 ft) with connector and bottom shoe |

falling from the bamboo ladder. Likewise, it causes severe physical and health problems. Therefore, the objective of this study was to introduce affordable, efficient harvesting equipment that can be operated by any person, to increase the effectiveness of harvesting process.

## MATERIAL AND METHODS

In order to avoid such situation in black pepper harvesting, KVK, Namakkal has introduced and supplied 30 feet Aluminium unipole ladder to tribal farmers on cost sharing basis (50% TSP + 50% farmers share) at Elangiyampatti village, Gundurnadu Panchayat of Kollihills under TSP 2020 -21. Before that KVK conducted off campus and skill trainings to farmers on that basis during August and October 2020. Farmer's doubts also cleared in the group meeting conducted during August - November 2020 and frequent crop advisories also provided. The aluminium unipole ladder was used by the farmers during the harvesting season of pepper and its effectiveness was observed in the 15 yr old pepper plantations of Kollihills and feedback of the farmers also collected.

## RESULTS AND DISCUSSION

In indigenous method of pepper harvesting, farmers purchased 30 - 40 feet well matured 5-7 yr old bamboo pole @ Rs.700/ pole from nearby villages. Then they removed the unwanted thorns in the bamboo and kept the bamboo pole in the plain ground and placed the 5-10 kg stones above that in 2 feet distance for 30 - 40 d to straighten the pole. After that they used the pole for harvesting purpose. Farmers / skilled labours climb the tree by using branch as a step arose from nodes of bamboo pole. By using bamboo pole the labours or farmers faced problems such as foot and leg pain. Continuous harvesting is not possible in this method because of pain in leg, mostly harvesting is proceeded with alternate days. This leads to fallen of matured berries and caused wastage and yield loss. With respect to durability, bamboo poles having minimum durability only 2-3 yr when compared to aluminium pole (14-15 yr) (Table.1) due to rain caused fungal infection and termite incidence that leads to breakage of pole. So it is unsafe to the climber.

By using Aluminium unipole ladder the farmers first got confidence to reached the vine height

**Table 2. Field Efficiency of Bamboo Pole Vs Aluminium Unipole Ladder for Pepper Harvesting.**

| Sr. No | Particular | Bamboo pole | Aluminium unipole ladder |
|---|---|---|---|
| 1 | No. of vines harvested / day<br>15 yr old vine<br>Less than 10 yr old vine | <br>4 vines<br>6 vines | <br>6 vines<br>8 vines |
| 2 | No. of labours required /day | 4 | 4 |
| | No. of labours utilized for harvesting of 360 vines (average) or 0.4 ha | 72 | 45 |
| 3 | Time taken to harvest / vine | 1.30 – 2 hrs | 1 hr |
| 4 | Quantity of pepper spikes with berries harvested / day | 300 kg green berries | 500 kg green berries |
| 5 | Cost involved / harvesting / day | Rs.500 /person & Rs.2000/ day | |
| 6 | Total cost involved for harvesting / 0.4 ha | Rs.36000/- | Rs.22500/- |

without fear. Safely reached the height up to 30 feet by using step like attachment in the unipole, it provided good grip to the foot of the climber. The farmers could harvest and carried the weight up to 100 kg of green berries. The farmers also realized about that which gives good hold with ground soil or base of the tree by bottom shoe, it tightly fixes the ladder. This was in conformity with the findings of Rahul *et al (* 2012).

With respect to field efficacy of both the ladders, highest number of pepper vines that is 6 pepper vines of 15 yr old or 8 vines of less than 10 yr old were harvested in a day from morning 7 am to afternoon 1 pm by using aluminium unipole ladder when compared to bamboo pole (4 & 6 vines). This was in accordance with the findings of Kahandage *et al* (2017). In a single vine two skilled labours harvest the matured pepper spikes around the vine by using two bamboo poles. On 0.4 ha area of land totally 330 -360 pepper vines were planted at a spacing of 10 x 10 feet or 12 x 12 feet by the farmer. By comparing the time taken for harvesting, one hour is required for harvesting single vine and an average of 500 kg pepper spikes were harvested / day by using Aluminium unipole ladder as against 1.30 hr – 2 hr/ vine and harvested 300 kg/d by bamboo pole method. Totally 72 skilled labours were involved in harvesting of 0.4 ha pepper plantations having 360 vines by using bamboo pole as against 45 labours by using aluminium ladder. So, the farmer could spend Rs.2000/- day as a labour charge for harvesting of pepper spikes for 6 hr (7 am -1 pm). In bamboo pole method, farmer could spend Rs.36000/- for labour charges of harvesting alone. But in aluminium pole method, farmer could spend only Rs.22500/- alone for harvesting, besides they save up to Rs.13500/- 0.4 ha.

The economic analysis (Table 3) revealed that the highest expenditure (Rs.87000/-) was incurred in bamboo pole method as compared to aluminium ladder (Rs.30000/-) and the maximum net return (Rs.2,06,500/-) was obtained by using aluminium unipole method. The highest cost of cultivation was due to high labour involvement in bamboo pole method of harvesting. Therefore, farmers could save an amount of Rs.13500/- besides getting additional profit of Rs.206500/- while using aluminium unipole ladder for harvesting. The cost: benefit ratio also highest (1:3.80) in this method. This was in conformity with the findings of Hameed Hussain and Nakkeeran ( 2017).

## CONCLUSION

Considering the utility and profitability, the farmers expressed satisfaction with the performance of Aluminium unipole ladder because it got better

**Table 3. Cost involved in pepper cultivation.**

| Sr. No | Particular | Detail | Total cost / 0.4 ha (Rs.) | |
|---|---|---|---|---|
| | | | Bamboo pole | Aluminium pole |
| 1 | Weeding & earthing up | 2 times/year @ Rs.200 / 6 hr (7 am -1 pm)<br>20 female labour / time<br>Total 40 labour @ Rs.200/- | 8000 | |
| 2 | Pruning of standard tree | One time/ year<br>40 men labour @ Rs.500/- | 20000 | |
| 3 | Cost of Farmyard Manure (including transport) | 1 lorry load/ 0.4 ha or 15 t | 13000 | |
| 4 | Farmyard Manure application | 20 m @ Rs.500/- men labour | 10000 | |
| 5 | Harvesting | Bamboo pole - 72 men labour/ 0.4 ha<br>Aluminium unipole ladder – 45 men labour / 0.4 ha<br>@ Rs.500/ men labour | 36000 | 22500 |
| Total expenditure | | | 87000 | 73500 |
| 6 | Yield | Green berries: 2100 - 2800 kg / 0.4 ha<br>Dry recovery – 3:1<br>Dry pepper: 700 - 935 kg / 0.4 ha @ Rs.400/kg | | |
| 7. | Economics | Gross income / 0.4 ha | 2,80,000 | |
| | | Net income / 0.4 ha | 1,93,000 | 2,06,500 |
| | | B:C | 3.22 | 3.80 |

preference due to its safety, affordability which can be operated by any person for harvesting pepper irrespective of gender and skill, easy handling, fearless harvesting, cost saving and increased effectiveness of harvesting process. In addition to weight bearing bottom stand consist of a shoe

Preparatory work in bamboo pole for harvesting of pepper

Training on Pepper harvesting by using Aluminium unipole ladder

**Harvesting of pepper by using bamboo pole**

**Harvesting of pepper by using aluminium unipole ladder**

like structure to support to the ladder to operate in vast range of area without moving the ladder. The locknut was made at a 20 feet height with a tightening mechanism to hold the ladder at desired height. Since this equipment is a simple one and chances of frequent maintenance will be less.

The plucking of pepper spikes with this equipment has been tried by the laborers including ladies. The total achievable height of the equipment was 30 feet. The farmers of adjoining areas were also convinced and interested to adopt this tool for pepper harvesting. It can be concluded that, this aluminium unipole ladder can effectively replace the bamboo pole harvesting of pepper.

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*Received on 29/5/2021* *Accepted on 5/8/2021*